

REMARKS

The examiner has rejected claims 1 and 3 under 35 U.S.C. 102 over Langley. Applicants respectfully assert that this ground of rejection should be withdrawn.

The present invention relates a reactor/heat exchanger cooler assembly for the oxidation of ethylene to form ethylene oxide. The claims require a reactor and heat exchanger cooler assembly which is comprised of a tubular reactor having an upper inlet head and a lower outlet head, reaction tubes packed with catalyst within said reactor supported by an inlet end tube sheet and an outlet end tube sheet, a tubular heat exchanger having an upper end and a lower end, and comprising upper and lower end tube sheets supporting tubes within said exchanger, *the upper end of said heat exchanger being integrally affixed to said reactor lower outlet head*, said reactor outlet head having an opening for the passage of reaction gases from the reactor to said exchanger and through tubes in said heat exchanger whereby said reaction gases are cooled by indirect heat exchange with a heat exchange fluid introduced into said heat exchanger.

Langley also relates to a process of producing ethylene oxide. Their process is conducted using an apparatus which contains some common components, such as cooling tubes and packed beds, with the present invention as well as those previously known in the art. However, it is submitted that Langley not only fails to teach each aspect of the present claims as amended, but also that Langley expressly *teaches away* from the present invention.

According to the amended claims, the assembly's tubular reactor has a *lower outlet head* which is *integrally affixed* to an *upper end* of a tubular heat exchanger. Such is not shown by Langley. First, as shown in the present Fig. 1, the inventive reactor and the heat exchanger are *integral*, that is, both the reactor and the heat exchanger are present in a common tube structure. The present specification (on p.4 lines 12-16) explicitly states that the structure of the present invention *differs* from conventional practices where a

reactor and separate external heat exchanger are connected via a conduit. Langley is in direct contrast to the present invention, wherein their reactor 1 and their tube cooler 11 are present as separate structures attached by a pipe 10. Furthermore, it can be clearly seen in Langley that a *lower* end of their reactor 1 is attached to a *lower* end their tube cooler 11, while the present claims require the *upper end* of said exchanger being integrally affixed to the reactor's *lower outlet head*. It is submitted that the absence of these feature of the present invention from the cited reference renders the invention patentably distinct from Langley. It is therefore respectfully urged that the 35 U.S.C. 102 rejection should be withdrawn.

The examiner has also rejected claims 1 and 3 under 35 U.S.C. 103 over Langley. The examiner states that it would be obvious for one skilled in the art to formulate the present invention upon a reading of Langley. Applicants respectfully submit that this conclusion is unfounded, for the reasons argued above, wherein a key feature of the present invention is not taught or suggested by this reference.

As taken from the present specification at page 4, lines 12-16, the heat exchanger 7 is an "integral part of reactor 1.... as contrasted to conventional practice where a conduit is provided to convey reaction gases to a separate external heat exchanger." The Examiner urges that since Langley's pipe 10 is attached to their reactor and tube cooler, that these components are integral. However, it is urged that there is *no teaching* of these components being *integral* as required by the present invention. The present specification (on p.4 lines 12-16) explicitly states that the structure of the present invention *differs* from conventional practices where a reactor and separate external heat exchanger are connected via a conduit. Langley is in direct contrast to the present invention, wherein their reactor 1 and their tube cooler 11 are present as separate structures attached by a pipe 10.

In addition, the configuration of the present apparatus with integral heat exchanger serves to *limit the formation of aldehydes* (see p.1, lines 14-19). In contrast, Langley's apparatus

teaches the affirmative formation of aldehydes, followed by subsequent conversion of these aldehydes to more ethylene oxide (see column 1, lines 29-41).

Furthermore, as stated above, the present claims require the *upper end* of said exchanger being integrally affixed to the reactor's *lower outlet head*. Langley, however, directly teaches away from this requirement wherein the *lower end* of their reactor 1 is attached to a *lower end* their tube cooler 11.

It is urged that there is no teaching or suggestion in Langley which would have inspired one skilled in the art to formulate an apparatus having the structure, or the benefits and advantages associated with the structure, of the present claims upon a reading of the cited reference. Thus, is respectfully requested that the 35 U.S.C. 103 rejection be withdrawn.

The examiner has rejected claim 2 under 35 U.S.C. 103 over Langley in view of Ozero or Sawada. Applicants respectfully submit that this ground of rejection should be withdrawn.

The examiner takes the position that Langley teaches each feature of the presently claimed invention except for the use of water as a cooling fluid. He attempts to fill this void by citing Ozero or Sawada for teaching ethylene oxide reactors which use water as a coolant. It is respectfully urged that the examiner's use of these references is not well taken.

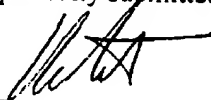
The arguments against Langley are repeated from above and apply equally here. That is, Applicants urge that Langley fails to teach a structure wherein the reactor and an *integral* heat exchanger. Langley also teaches away from the present invention by having the *lower end* of their reactor 1 attached to a *lower end* their tube cooler 11. Furthermore, Langley's process/apparatus fails to limit the formation of aldehydes.

Regarding Ozero and Sawada, these references certainly relate to ethylene oxide reactor vessels, and each teach the use of water as a coolant. However, it is submitted that there

is *nothing* in these cited references which would lead one skilled in the art to combine either of Ozero or Sawada with Langley. In fact, neither reference teaches a structure which *would or should* be combined with Langley in an effort to devise present invention. For instance, neither Ozero nor Sawada teach or suggest an assembly having a tubular reactor having reaction tubes supported by an inlet end tube sheet and an outlet end tube sheet, and having a tubular heat exchanger *with its own upper and lower end tube sheets* supporting tubes within the exchanger. It is urged that one skilled in the art would not have been inspired to combine the teachings Ozero or Sawada with Langley as the examiner suggests. It is further submitted that a hypothetical combination of Langley with Ozero or Sawada would still fail to obviate the present claims, for the reasons stated above. Thus, it is submitted that a prima facie case of obviousness has not been made, and that the 35 U.S.C. 103 rejection should be withdrawn.

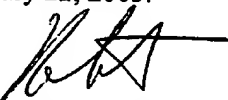
The undersigned respectfully requests re-examination of this application and believes it is now in condition for allowance. Such action is requested. If the examiner believes there is any matter which prevents allowance of the present application, it is requested that the undersigned be contacted to arrange for an interview which may expedite prosecution.

Respectfully submitted,



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I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office (FAX No. 703-872-9306) on February 22, 2005.



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